Fontys Hogeschool ICT

Courses overview FHICT English stream

This is the complete overview of all courses offered by FHICT English stream. It contains complete information about all courses from all programs of the English curricula of FHICT for cohorts that started before september 2019. Courses that are used in different curricula are duplicated, but are equal by definition.

Due to the schedules and changes in curricula, not all courses described in this document are actually offered in the period this document is about. In such case, the information may be incomplete or outdated. The correct information is provided in the document covering the period in which a course is given.

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1. Information about Specialisation ICT & Business

1.1. Information about Internship

Content

During the four year bachelor course Information & Communication Technology you will work as a trainee in a company (profit or non-profit).

This internship comprises 90-100 working days (planned in the second semester of the third year). Take enough time to prepare yourself!

In this brochure you will be informed about the preparation, the realization and the evaluation of the internship project period.

Learning outcomes

- Student is able to apply all teached knowledge during the graduation project
- Student is capable of applying the DOT framework research model
- Student can critical assess the environment of the company and set frequirements and scope by interviewing business people
- Student has the capability to advice the company with recommendations
- Student is capable of working by him / her self
- Student takes an entrepeneural attitude
- Student is able to adapt to the business and codes of conduct and regulations in the company

Student can finish his / her product / project within 90-100 days

Examination and grading

Examination

internship project > 5.5 (40%)

Presentation before university tutor and company tutor > 5.5 (20%)

Process Report > 5.5 (40%)

Tools allowed

Not applicable

Resits and repairs

Student can, after approval of the FHICT Examboard, repair either the presentation or the report but not the work. All parts must be 5.5 or higher. In case of repair a maximum mark of 6 is awarded.

Grading

Student is assessed at the company by the university tutor and the company tutor for the work contents and attitude at the company

Student is assessed and questioned during his / her presentation before the university tutor and the company tutor

Student is assessed on his / her process report

Teaching methods

University tutor visits the company and the student at least two times. One time between week 4-6 and one time to rehearse the final presentation and discuss the marks

Resources

all learned at Fontys ICT

1.2. Information about 29ita-18 IT auditing

Content

It Auditing will introduce the basic principles of IT auditing to the student. Models and regulations will be discussed and through several assignments and cases the student will learn the broadness of the field of work of an IT Auditor. The basics finds its inheritance in the financial processes. During the course the student will understand the importance of understanding the business processes and is able to define and model processes in tooling like Bonitasoft.

Learning outcomes

Learning outcomes. The student will be able to:

- Understand the impact of an IT- Audit
- Understand and apply the business ethics
- Capable of writing an advice report on high level topics
- Understand the components of an IT-Audit and understand the relation to business processes and financial processes
- Perform an IT-Audit on a financial or outsourcing process
- Understand the principles of Compliancy and due diligence
- Understand and apply internal controls
- Understand the different types of audits
- Understand the relation to cyber security
- Understand the different models of outsourcing and how to audit outsourcing
- Understand the principles of CISA
- Perform a risk assessment on a practical case and explain the consequences
- Understand and apply IT governance
- Understanding IT strategies
- Is capable of advicing a company on the best strategy towards IT Auditing

Examination and grading

Examination

During classes students deliver several homework cases and present them. Further an end essay must be written and a presentation given in week 7 of the course.

A written exam is optional

Tools allowed

During class all given materials, Sharepoint and a Lynda.com videotraining

At the written exam nothing.

Resits and repairs

Every semester the course is given a possibility to repair is possible.

Grading

Review of the quality of the handed in homework, essay and presentations

Teaching methods

7 x 4 hours classes with lots of discussions. 2 hours can be used for the homework and the final essay.

Resources

Sharepoint and during the class. In a later stadium through Canvas.

1.3. Information about 29ct-18

Content

The objective analysis of facts from a judgement. One of the most important skills for students to develop and to fade out Bias and find root-causes for problem definitions. The course will be focusing on learning new skills and techniques to critical assess problems, requirements and to reach the actual goals of customer demands. The basics are fundamentals for journalism and writing a theoretical thesis and scientific research.

Learning outcomes

Learning outcomes The student will be able to:

- Understand the impact of BIAS
- Critical assess problems and perform root cause analysis
- Model root-cause analysis
- Explaining an Issue or Problem. Upon completion of a faculty-designed intervention, students will demonstrate an increased ability to explain an issue or problem comprehensively.
- Employing Evidence/Information Effectively Upon completion of a faculty-designed intervention, students will demonstrate an enhanced ability to employ evidence/information in conducting a comprehensive analysis of an issue or problem.
- Analyzing Contexts. Upon completion of a faculty-designed intervention, students will demonstrate an enhanced ability to analyze contexts when presenting a position on an issue or problem.
- Describing Your and Others Perspectives Upon completion of a faculty-designed intervention, students will demonstrate an enhanced ability to describe he/her perspectives along with those of others associated with the situation.
- Formulating a Thesis/Hypothesis Upon completion of a faculty-designed intervention, students will demonstrate an enhanced ability to formulate a thesis/hypothesis that takes into account the complexity of an issue or problem.
- Drawing Logical Conclusions Upon completion of a faculty-designed intervention, students will demonstrate an enhanced ability to draw logical conclusions and implications from the analysis of an issue or problem.

Examination and grading

Examination

Several cases during the class, discussions, presentations and a final essay on a self chosen topic with critical reflection and the use of the verbs during the course.

In week 7 demonstrating the essay and critical assess the chosen topic.

Tools allowed

Laptop, and give materials. Lynda.com video course

Resits and repairs

Every semester the course is given a possibility to repair is possible.

Grading

Final essay + presentation

Optional written exam based on a case.

Teaching methods

7 classes of 4 hours containing theory and practical cases

Resources

Sharepoint handed out in the class and videocourse Lynda.com

1.4. Information about 29mot-18

Content

MOT focuses on the knowledge and understanding of lifecycles in ICT. How will the fluctuate during economic situations and in several branches in time? What are tools to transform your business to another model or towards outsourcing.

What is the impact of low-code / no-code platforms like Blueriq and Outsystems?

Learning outcomes

Learning outcomes The student will be able to:

- Understand the needs for changes to business transformation
- Understand and apply the Nolan lifecycle model
- Understand the evolution of ICT Business integration
- Knows the competences of business integration and can apply them
- Understand the complexity of organizational change and relation to ICT
- Understand the impact on employees based on changes and transformations
- Able to understand and apply models like: TQM, Balanced Scorecard, Five Forces of Porter, Nolan-Norton Lifecycles, Creating value. INK.
- Understand and apply governance models
- Understand change management processes
- Understand the use of low code / no code platforms

Examination and grading

Examination

Cases during class, presentations and a final essay individual with a presentation

Tools allowed

Laptop and all handed over materials.

Resits and repairs

Every semester the course is given a possibility to repair is possible.

Grading

Final essay and presentation. During class attendence and collaboration

Teaching methods

7 classes of 4 hours

Resources

Sharepoint, pdf, books, handed over materials by the teacher.

1.5. Information about 29bia-18 Business IT alignment

Content

BIA (Architectural frameworks and Enterprise Architecture as Strategy)

Business and Information Technology Alignment

BIA is essentially the core of the Business IT training. Imagining the business on IT and matching it is the core of the training. At the strategic level, imaging is not a simple task and therefore use is often made of architectural methods and models. We continue to build on models that are used earlier in the curriculum, such as the reference models BISL, ITIL and ASL, but also ordering models such as the 7-S model from Mc Kinsey and DESTEP.

IT strategy and planning is not easy. By looking further ahead, the theory is much more detached from reality than within the models that focus more on the operation and organization of IT. BIA has a lot in common with the other courses in semester 7. Changing among architecture naturally has many points of contact with change management as it is dealt with in BPM. Many architectural models are also control models and therefore have many interfaces with the "Governance" models as they are treated at ITA.

- Architectural models, architecture methods, working under architecture, maturity models, strategy development models, testing information plan, Enterprise architecture as strategy

Learning outcomes

Learning outcomes. The student will be able to:

- Understand and apply current architectural models in practice from basic to more extended models
- Understand and apply the business goals which will be connected to the information provision and the information technology.
- Apply and prepare criteria for information plans which must be met
- Understand, apply an able to advice how strategy is developed in large service companies related to IT
- Apply the correct business models based on business criteria seen in a company, and deliver a proper advice
- Apply models like: the business model Canvas, to cases and real life situations Archimare and the Novius Architectural Framework

Examination and grading

Examination

Assignments during class and a final assignment for week 7

Tools allowed

Laptop and handed over materials by the teacher

Resits and repairs

Every semester the course is given a possibility to repair is possible.

Grading

Final assignment and active learning in the class

Teaching methods

7 classes of 4 hours

Resources

Sharepoint, and handed over by the teacher

1.6. Information about 29bpm-18 Business Process Management

Content

Business Process Management is the area of management concerned with managing the processes operated by a business. This involves understanding several aspects of the way the business works, and then keeping these components working accurately and effectively in concert.

In the first place, we study Business Process Mining to discover the processes followed by the business, whether these are documented or not, and then record them using Business Process Modelling techniques such as UML or BPMN 2.0.

Secondly, we interface between the business processes that we have discovered using Business Activity Monitoring, and carefully evaluate the information that is used, captured, and delivered by those processes in the framework of Business Process Intelligence. Thirdly, we understand the relationship between mined business processes and Business Operations Management.

The overall picture of the business that is developed is a synthetic model of the actions that are possible and desirable for the business, which enables effective management of the business to be conducted on the basis of understanding clearly the consequences of any proposed process change.

Learning outcomes

The key learning outcomes. The student will be able to

- Describe business processes derived from verbal and written case studies
- Build formal models of those processes using methodologies such as BPMN2.0
- Understand how to choose appropriate tools for modelling different processes
- Relate the business processes to business information and business intelligence.
- Work from mining business processes to managing and improving business operations.

Examination and grading

Examination

Minor individual and group assignments during class sessions, and a final assignment for the last week.

Tools allowed

NA

Resits and repairs

The course will be given each semester. Repair is possible.

Grading

Final assignment and active learning in the class.

Teaching methods

The course consists of 7 weeks with a total of 4 class hours per week.

Resources

Laptop, case studies and specific materials to be handed over at the relevant time. The class material will be distributed via Sharepoint and/or Canvas, and directly.

1.7. Information about Minor (free choice)

Content

Learning outcomes

Examination and grading

Examination

Tools allowed

Resits and repairs

Grading

Teaching methods

Resources

1.8. Information about Graduation Project

Content

During the last semester of the bachelor course Information & Communication Technology the student must show he can function at the level of a graduate by completing a graduation project. This project comprises 90 - 100 working days and is normally carried out in the business community.

In this brochure you will be informed about the preparation, the realization and the evaluation of the graduation project period

There are only 5 possible starting dates per year for your graduation: Four at the first or second week of every quarter, and a fifth possibility in week 5 of the spring semester (feb-july). Below, all start dates are indicated by A,B,C,D and E. Accompanying graduation proceedings dates are indicated by A, B, C, D and E. In some cases the proceedings can also take place 1 week sooner.

Failure to start or finish a graduation on the dates below will automatically mean the start or finish will be postponed to the next scheduled possibility. To be able to start in a quarter, the student needs to have an approved survey on Wednesday of week 8 of the previous quarter. (for instance: for starting in September, you will need to have an approved survey before Wednesday in week 8 of the April-July quarter)

Learning outcomes

- Student is able to apply all teached knowledge during the graduation project
- Student is capable of applying the DOT framework research model
- Student can critical assess the environment of the company and set frequirements and scope by interviewing business people
- Student has the capability to advice the company with recommendations
- Student is capable of working by him / her self

- Student takes an entrepeneural attitude
- Student is able to adapt to the business and codes of conduct and regulations in the company
- Student can finish his / her product / project within 90-100 days
- Student is able to present the results in a process way with enough underpinning of choices before a jury

Examination and grading

Examination

Graduation project > 5.5

Presentation before jury > 5.5

Process Report > 5.5

Tools allowed

Not applicable

Resits and repairs

Student can, after approval of the FHICT Examboard, repair either the presentation or the report but not the work. All parts must be 5.5 or higher. In case of repair a maximum mark of 6 is awarded.

Grading

Student is assessed at the company by the university tutor and the company tutor for the work contents and attitude at the company

Student is assessed and questioned during his / her defence presentation before the jury

Student is assessed on his / her process report

Teaching methods

University tutor visits the company and the student at least two times. One time between week 4-6 and one time to rehearse the final presentation and discuss the mark for the work at the company

Resources

all learned at Fontys ICT

2. Information about Specialisation ICT & Software Engineering

2.1. Information about Internship

Content

During the four year bachelor course Information & Communication Technology you will work as a trainee in a company (profit or non-profit).

This internship comprises 90-100 working days (planned in the second semester of the third year). Take enough time to prepare yourself!

In this brochure you will be informed about the preparation, the realization and the evaluation of the internship project period.

Learning outcomes

- Student is able to apply all teached knowledge during the graduation project
- Student is capable of applying the DOT framework research model
- Student can critical assess the environment of the company and set frequirements and scope by interviewing business people
- Student has the capability to advice the company with recommendations
- Student is capable of working by him / her self
- Student takes an entrepeneural attitude
- Student is able to adapt to the business and codes of conduct and regulations in the company

Student can finish his / her product / project within 90-100 days

Examination and grading

Examination

internship project > 5.5 (40%)

Presentation before university tutor and company tutor > 5.5 (20%)

Process Report > 5.5 (40%)

Tools allowed

Not applicable

Resits and repairs

Student can, after approval of the FHICT Examboard, repair either the presentation or the report but not the work. All parts must be 5.5 or higher. In case of repair a maximum mark of 6 is awarded.

Grading

Student is assessed at the company by the university tutor and the company tutor for the work contents and attitude at the company

Student is assessed and questioned during his / her presentation before the university tutor and the company tutor

Student is assessed on his / her process report

Teaching methods

University tutor visits the company and the student at least two times. One time between week 4-6 and one time to rehearse the final presentation and discuss the marks

Resources

all learned at Fontys ICT

2.2. Information about Minor (free choice)

Content

Learning outcomes

Examination and grading

Examination

Tools allowed

Resits and repairs

Grading

Teaching methods

Resources

2.3. Information about ANDR1 Android 1

Content

In this course, you will learn how to design and create basic Android apps in Android Studio.

Prerequisites

A good knowledge of an Object Oriented language (like C#) is required, as well as the ability to use a regular IDE (like Visual Studio).

Learning outcomes

Learning outcomes of this course are:

- The student can design an Android app according to the Material Design.
- The student can create Activities with Views and Layout.
- The students understands the steps in the lifecycle of an Activity.
- The student can create event handlers, and knows how to use Intents.
- The student can create and use Fragments.
- The student can read and interpret JSON data.
- The student can apply Android Manager classes.

Examination and grading

Examination

During the weeks, there are assignments for which students can get formative feedback and feed-forward (constructive guidance on how to improve) from the teacher. These assignments are not mandatory.

Each student must implement a basic app, according to some given requirements.

There is a written summative exam afterwards, in which the learning objectives are tested.

Tools allowed

Everything on paper.

Resits and repairs

Re-take is possible in the next semester.

Grading

The app that was created must be demonstrated and explained individually before the written exam. If this is done sufficiently, the final grade is the grade for the written exam. If the app is not demonstrated or explained sufficiently, the final grade is 1.

Teaching methods

The course lasts 7 weeks. Each week there are 2 + 2 contact hours with the teacher. Each topic is introduced by the teacher. For each topic a practical assignment is available, which helps students to practice and for which students can get feedback from the teacher. The student can work on the required app.

Resources

Slides and practical assignments on SharePoint, accessible through Canvas.

Android documentation and tutorials.

2.4. Information about ANDR2 Android 2

Content

In this course, you will do a project in which you design, create, test and deploy an advanced Android app in Android Studio.

Prerequisites

ANDR1 must have been finished with at least 5.

Learning outcomes

Learning outcomes of this course are:

- The student can use Android Location service.
- The student can use a backend server (for example FireBase).
- The students can use multithreading in Android.
- The student can make unit tests and instrumented tests in Android Studio..
- The student can deploy an Android app to user(s)

Examination and grading

Examination

A group of students (typically 4) will design, build, test and deploy an Android of their choosing, following some specific requirements given.

Tools allowed

Anything

Resits and repairs

Re-take is possible in the next semester.

Grading

Students will be graded individually, depending on the project result and peer assessments. A grading scheme is provided as guideline.

Teaching methods

The course lasts 7 weeks. Each topic is introduced by the teacher, and can be applied in the project. Remaining time is used to work on the project.

Resources

Slides and practical assignments on SharePoint, accessible through Canvas.

Android documentation and tutorials.

2.5. Information about ITOPS IT Operations

Content

Subjects:

- IT service management processes according to ITIL v3 (grouped into service strategy,
- service design, service transition, service operation, and continuous improvement)
- Process approach of an organization; 3 layer organization: Strategic, Tactical,
- Operational
- Quality management; Advising.
- Preparation for the official ITIL v3 Foundation exam

Learning outcomes

- The student has an overview in the field of IT service management, and has an understanding of different methodologies to manage an IT operations department ;
- The student gains knowledge of the ITIL methodology;
- The student understands and can advise how to set up and improve IT services (in the form of a report and a presentation);
- The student is prepared for the official ITIL Foundation exam.

Examination and grading

Examination

- written exam (50%)
- case advisory report and 2 presentations (50%)

Tools allowed

Geen.

Resits and repairs

Volgende semester is er herkansing.

Grading

Your grade is built up based upon group activities (with group of 4-6 studentes) and individual activities. For students who show higher or lower performance in their group thant the group average, a higher or lower grade will be given. For each assignment or test you can get a score between 1 and 10 (with 10 highest grade).

- Group activities:
    - Do research to an IT operations/IT Service management method and present on it. (25 % of final grade)
    - Based upon a given case, develop an advisory report and present it. (25% of final grade)
- Individual activities:
    - 4 small tests in weeks 2, 3, 5 en 6: the tests will be held at the start of the lectures and will take approximately 10 minutes. For each sufficient test you can score 0.2 bonus points for the final test. If all tests are scored sufficiently you will receive an extra bonus of 0.2 points. This will lead to a maximum total of 1 bonuspoint on the final test.
    - Final test: At the end of the ITOPS course, you will get a test which is a combination of multiple choice questions and open questions. The focus of this test is ITIL v3. (50% of final grade).

- If the result for the final test is insufficient (lower than 5.5), the result of the final test will define your final grade.
- Attendance: this is compulsory for each lecture and for each group activity. You are allowed to be absent **once.** However, you need to state official reasons for doing so.

Teaching methods

A true understanding of IT service management requires that you practice yourself with setting up IT service management. Therefore, doing own research, working on cases and presenting your advise is an important part of this course. Every new concept of IT service management and ITIL is introduced as a lecture.

- A weekly lecture of maximum 1 hour in which an introduction is given on specific parts of the matter. You can further elaborate on the topic with the textbook and by working in small project groups.
- In the weeks 2, 3, 5 and 6 each lecture will start with a small test. The individual scores have a weight in the final result. (See study guide how the final grade is defined).
- Per group of 4-6 students, work on a given case that leads to an advise report and a presentation about your findings and advise.
- Per group of 4-6 students, choose a topic related to IT operations, do research about it and present to the whole class.
- Exam in which you show your understanding of IT operations (partly multiple choice, partly open questions).

Resources

- Foundation of ITIL v3, Jan Van Bon, et al. Van Haren Publishing. ISBN 978 90 8753 057 0
- Sharepoint environment: ITOPS reader, case description, slides

2.6. Information about EBUS E-Business

Content

- *E-tech: the backgrounds about the function and structure of networks and servers in general and specially of the internet.*
- *E-com: the economical, organizational and commercial consequences of doing business over the internet (e-commerce).*
- *E-prog: basic knowledge about the most used languages and tools for building a website and a web shop.*
- *E-project: a project in which a web shop is being build.*

Learning outcomes

- *Technical knowledge about the function and structure of networks and servers in general and specially of the internet.*
- *Knowledge about the economical, organizational and commercial consequences of doing business over the internet (e-commerce).*
- *Knowledge about the most used languages and tools for building a website and a web shop.*

Examination and grading

Examination

- *E-tech: exam*
- *E-ecom: case study and presentation on an e-commerce related subject.*

E-project: a ready made and functional web shop

Tools allowed

none

Resits and repairs

retake every semester

Grading

Review of exam and case study. 2 Separate marks

Teaching methods

7 classes of 4 hours

Resources

- *lecturer notes and ppt's,.*
- *books :*

2.7. Information about BEC1 Business Economics 1

Content

Topics that are discussed during the module

- Introduction to financial reports
- Introduction to financial ratio analysis
- Setup a bookkeeping system and calculate profit and equity. Further calculate costs, expenditures and incomes.
- Financial accounting scenario: ledger, journals, day book, subsidiaries, computing
- Special entries: accrual vs cash system, error bookings, interest bookings, private accounts, funds in transfer

- Financial Accounting.
  - Balance Sheet
  - Income statement
  - Retained earinings
  - Basic GAAP rules
- Fixed assets vs. current assets
- Drawings account
- Cash transfers
- Accrued cost
- Annual Closure (Trial Balance)
- Balanced score card

Learning outcomes

-

○ Understand the importance of financial reports
○ understand the different types of financial ratios
○ Able to understand the numbers of the financial ratios
○ Able to compare companies of different size based on ratio analysis
○ Able to setup a basic bookkeeping system
○ Able to understand Trial balances, balances, profit & loss statements
○ understand taxation systems

Examination and grading

Examination

- Group assignments which have been assessed by individual contribution and individual portfolios.(40%) and small test in week 5
- Written exam (60%) in week 8

Tools allowed

pen and calculator

Resits and repairs

Next semester retake

Grading

- Individual feedback on assignments
- Group feedback on assignments and presentations
- Individual feedback on small test in week 5
- Weeks of presentations are mandatory

Teaching methods

7 classes of 4 hour with theory, presentations, assignments

Resources

-

From bookboon

- The accounting Cycle (PDF file)
- International financial accounting. (PDF file)
- Provided slides

2.8. Information about BEC2 Business Economics 2

Content

- Introduction to financial reports
- Introduction to financial ratio analysis
- Setup a bookkeeping system and calculate profit and equity. Further calculate costs, expenditures and incomes.
- Financial accounting scenario: ledger, journals, day book, subsidiaries, computing
- Special entries: accrual vs cash system, error bookings, interest bookings, private accounts, funds in transfer

Learning outcomes

- Understand the importance of financial reports
- understand the different types of financial ratios
- Able to understand the numbers of the financial ratios
- Able to compare companies of different size based on ratio analysis
- Able to setup a basic bookkeeping system
- Able to understand Trial balances, balances, profit & loss statements
- understand taxation systems

Examination and grading

Examination

- Group assignments which have been assessed by individual contribution and individual portfolios.(40%) and small test in week 5
- Written exam (60%) in week 8

Tools allowed

pen and calculator

Resits and repairs

Next semester redo of the exam or retake of the course in case practical failed

Grading

Presentations / Assignments (40%)

Exam written week 8 (60%)

Teaching methods

7 Classes of 4 hours

Theory, assignments, feedback, presentations

Resources

- The Accounting Cycle; Authors Larry M. Walthr; Christopher J. Skousen; ISBN 978-87-7681-486-1
- Slides and practical assignments on the SharePoint.
- Internet sources
- The essence of financial accounting - Leslie Chadwick - ISBN: 0-13-356510-6

2.9. Information about SePr Secure Programming

Content

Subjects:

- The Secure Development Lifecycle (SDL).
- Overview Hacking threats, hacking techniques, possible impact.
- Risk and security threat analysis for software systems. (STRIDE, Attack Trees, misuse cases).
- Analysis and application of Software Security Principles.
- Analysis programming language and environment on vulnerabilities.
- Analysis programming language and environment on available security functionality.

Learning outcomes

- Learn what hacking techniques are used by hackers, and learn how these techniques work.
- Being able to analyse and apply a secure software development process (risk analysis, secure design, coding, testing).
- Have insight in the most essential security related coding problems and being able to find and apply solutions in software systems.

Examination and grading

Examination

- peer learning report on web hacking techniques assessment
- SDL presentation assessment
- group work report assessment
- final presentation assessment

Tools allowed

N/A

Resits and repairs

In the next semester

Grading

Final grade is 65% of peer learning hacking techniques report assessment and 35% of the group work assessment

Teaching methods

lectures and practicals

Resources

lectures (theory) and practicals (instructions)

2.10. Information about IPV1 Image Processing Vision 1

Content

Image Processing & Vision (IPV)

This course is an introduction of the basics/advanced techniques of **image processing** and **computer vision.**

IPV consists of 2 parts during the semester 7:

- IPV1 in the block 1(week 1~~10, 3EC).
- IPV2 in the block 2(week 11~~20, 3EC).

Prerequisites

Entry requirement for each module:

- IPV1: you are currently in semester 7
- IPV2: you are currently in semester 7 and you have successful completed the module IPV1

Learning outcomes

Learning objectives

You should understand and be able to apply:

- The basics of MATLAB, DIPimage, loading and display image.
- Image filtering
- Point operations (histogram-based operation, thresholding)
- Image enhancement; image restoration
- Binary morphology
- Machine learning (recognize digits)
- Apply the basic and advanced image processing techniques to **computer vision domain;** for example, machine learning (recognize digits), preferable deep learning techniques.

Examination and grading

Examination

Assessment

The final grade for each module IPV1, IPV2 course will be based on two **assignments for final grade** (To be published by your lecturer during each block, check on share point and canvas for latest information!).

- You get a grade 1-10 for each assignment (no exam).
- Final grade for IPV 1, IPV2:
  - If both assignment grades >= 6, final grade = average of two assignments
  - If **not** all assignment grades >= 6, final grade = minimal assignment grade
- Final grade assignments must be submitted on canvas on time.
- Deadlines are strict! If you miss the deadline, you get 0 for that assignment
- If your submission (.mlx file) does not compile or cannot run on the lecturer's computer (due to missing images, syntax errors, etc.), then your assignment will not be checked, so your grade will be 1.
- **Bonus (*it is optional, TO BE DECIDED by your lecturer) --- 1 point added to final grade**
- If the lecturer decides to give it, it should be submitted on canvas on time.
- Students should be able to demo the assignment to the lecturer and explain correctly what they have done.

Tools allowed

NA

Resits and repairs

NA

Grading

See 3.2

Teaching methods

Activity

- **Formal registration for IPV1, IPV2**: During the first week of each block, you must be present and enrol yourself if you decide to take this elective course.
- Each module lasts 7 weeks. Each week there are 2 + 2 contact hours with the lecturer. Each topic is introduced by the lecturer.
- There are two types of assignments for IPV1, IPV2 courses, respectively:
- Assignments for feedback: For each topic, the practical assignment is available to help students to master the course content, students should finish those assignments firstly, students could ask the lecturer for the feedback in case students have problems or difficulty.
- **Assignments for final grade** (equal to the exam): Students are supposed to finish those assignments independently.

Resources

Slides, assignments, some background material.

2.11. Information about IPV2 Image Processing Vision 2

Content

Learning outcomes

Examination and grading

Examination

Tools allowed

Resits and repairs

Grading

Teaching methods

Resources

2.12. Information about SOT Service Oriented Techniques

Content

In this course you will learn how to make (web) services and clients. The course covers two techniques in programming language Java: (1) RESTfull service applications and RESTfull client applications for synchronous communcation; and (2) Java Messaging Service for asynchronous request-reply communication between two applications.

Learning outcomes

Learning outcomes of this course are:

- **Student can describe the differences between RESTfull and JMS as synchronous/asynchronous techniques.**

- **REST learning outcomes:**
  - Student can make a RESTfull service and client in Java.
  - Student can deploy a RESTfull service via an HTTP server.
  - Student can deploy a RESTfull service on Tomcat.
  - The student can use JSON serialization.
- **Java Messaging Service learning outcomes:**
  - Student can make Java applications which send and receive JMS messages.
  - Student can use both JMS Queues and Topics for exchanging messages.
  - Student can make a request-reply type of communication with JMS between two Java applications.

Entry requirements

Successful completion of:

- year 1 of software engineering studies, and
- year 2 of software engineering studies, and
- year 3 of the software engineering studies, and
- the Internship.

Examination and grading

Examination

During the lessons you will get assignments for which you will get formative feedback (to which extent did you achieve the learning goals) and feed-forward (constructive guidance on how to improve) from the teacher.

Students make two INDIVIDUAL assignments at home, these assignemnts are for summative assessment:

1 REST assignment - In this assignment students make a RESTfull web service and client application(s).

- JMS request-reply assignment – In this assignment students use JMS to realize asynchronous request-reply communication between two Java applications.

Tools allowed

All additional aids are allowed.

Resits and repairs

Re-take is possible in the next semester.

Grading

For each of the two assignments (REST and JMS) a grade in the range 1 – 10 is given.

Final mark for SOT (**int** sot_grade) is in range 1 – 10 and it is calculated as folows based on "**int** rest_grade" and "**int** jms_grade":

if (rest_grade >= 6 && jms_grade >= 6){ **float** average_grade = (rest_grade + jms_grade) / 2; sot_grade = Math.*round*(average_grade); } **else** { sot_grade = Math.*min*(rest_grade, jms_grade); }

Teaching methods

The course lasts 7 weeks. Each week there are 2+ 2 contact hours with teh teacher. Each topic is shortly introduced by the teacher. For each topic a practical assignment is available, which helps students to practice and for which they can get feedback from the teacher.

Resources

- Slides and practical assignments on the SharePoint.
- Java EE, Java Messaging Service, JAX-RS.
- Apache Tomcat, Apache ActiveMQ.

2.13. Information about SAI Software Application Integration

Content

In order to execute one business process, users often need to use many different “business” software applications. This is why these “business” applications should be connected with each other through some kind of “middleware” application. The “middleware” integrates all “busi” applications by passing data between applications, performing necessary data transformation and routing. In general, “middleware” application can be made by (1) making a custom software application, or (2) using a generic tool like MuleSoft, JBoss, etc.

In this course you will learn how to use Enterprise Integration Patterns in order to make a custom middleware application which integrates several “business” applications.

Prerequisites:

Pre-knowledge of:

- Java,
- Java Messaging Service with Enterprise Application Integration patterns Return Address and Correlation Identifier,
- Java SOAP client, and
- Java REST client.

Learning outcomes

After this course, the student can:

- Apply and Implement Broker pattern.
- Apply and Implement Chained Gateways pattern.
- Apply and Implement Content Router and Content Enricher patterns.
- Apply and Implement Scatter-Gather pattern.

Entry requirements

Successful completion of:

- year 1 of software engineering studies, and
- year 2 of software engineering studies, and
- year 3 of the software engineering studies, and
- the Internship, and
- module Service Oriented Techniques (SOT).

Examination and grading

Examination

During the lessons you will get assignments for which you will get formative feedback (to which extent did you achieve the learning goals) and feed-forward (constructive guidance on how to improve) from the teacher.

For summative assessment students implement integration of a real-life example. Several “business” applications are delivered, and each student implements the integration based on a given business case. This summative assignment is done INDIVIDUALLY.

Tools allowed

All additional aids are allowed.

Resits and repairs

Re-take is possible in the next semester.

Grading

Students implement integration of a real-life case example assignment. This assignment is presented to students in week 6. Approximately 5 “business” applications are delivered, and students implement the integration based on a given business case. The final grade is determined based on the following matrix:

	6	7	8	9	10
The system works correctly with one "bank" application	x	x	x	x	x
Message Broker	x	x	x	x	x
Correlation Identifier	x	x	x	x	x
Return Address	x	x	x	x	x
Content-Based Router		x	x	x	x
Content Enricher		x	x	x	x
Messaging Gateway			x	x	x
Chained Gateways			x	x	x
The system works correctly with three "bank" applications				x	x
Recipient List				x	x
Aggregator				x	x
Scatter-Gather				x	x
Flexible evaluation of "bank" rules (e.g., use of Jeval library).					x

Final marks

Teaching methods

The course lasts 7 weeks. Each week there are 2 hours of lecture and 2 hours of practical. A lecture consists of a short presentation of main topics followed by a demonstration by the teacher. For each topic a practical assignment is available, which helps students to practice. In week 6 the final assignment is presented (for final assessment).

Resources

Book: Enterprise Integration Patterns : Designing, Building, and Deploying Messaging Solutions, by Gregor Hohpe, Bobby Woolf, ISBN 0321200683, Addison-Wesley, 2004

Technologies: Java EE, Java Messaging Service, JAX-WS, JAX-RS.

2.14. Information about TLA Applied Linear Algebra

Content

This course covers various aspects regarding applied linear algebra for application in computer graphics:

- distances between points, lines and planes
- angles between lines and planes
- left- and right-rotating coordinates systems
- converting a coordinates system
- representing a 3D-world on the screen
- rotations and translations in R3
- matrix calculations
- painter's algorithm
- parallel light and point light

Learning outcomes

The student can do calculations on:

- distances between points, lines and planes
- angles between lines and planes
- left- and right-rotating coordinates systems
- converting a coordinates system
- representing a 3D-world on the screen
- rotations and translations in R3
- matrix calculations
- painter's algorithm
- parallel light and point light

Examination and grading

Examination

written exam

Tools allowed

simple calculator + Derive

Resits and repairs

next semester

Grading

final grade is grade of written exam

Teaching methods

lectures with theory and practical

Resources

slides, reader, exercises

Derive

2.15. Information about TCI Testing and Continuous Integration

Content

In this course you will learn and apply different types of testing techniques by using a variety of JAVA frameworks. Also, best code practices quality insurance will be discussed through a process of continous integration.

Prerequisites

- Knowledge of the JAVA language;
- Knowledge of Client-server architecture (CSA) and web responses (WEB1-2-3);
- Knowledge of a JAVA web application technique (RESTful or SOAP using either POJO and Apache Tom Cat or Spring);
- Math 3 (graphs theory and search algorithms);
- Knowledge of GIT (pulling, pushing and merging);

Learning outcomes

The learning outcomes of this course are:

- The students know how to write unit test that make use of mockups, using Mockito Framework, to cover the application project they work on during the course;
- The students apply use of code styles in the assignment project;
- The students learn how to make their code decoupled by using building tools (Gradle) and manage dependencies;
- The students are capable of unit tests, using JUnit framework, that cover an application project they work on during the course;
- The student can perform tests, other than unit tests, on his software (for instance: make use of JMeter to run stress tests on his application and create a report with it);
- The student learn about code coverage and perform code analysis making use of Intellj IDEA and applying it on the project they will work on.;
- The student practices collaboration by making pull requests through online collaboration tools and fixing them via GIT clients;
- The student knows how to install and/or use a Jenkins continuous integration environment for JAVA application development.

Examination and grading

Examination

During the lectures the student is prepared to face the practical assignments and receives formative feedback (to which extent did you achieve the learning goals) and feed-forward (constructive guidance on how to improve) from the teacher.

The final summative examination is conducted at the end and aims to verify the acquired skills. The test consists in a check that considers the learning goals:

- Application development
- Unit Testing
- Stress Testing

- Code style
- Documentation and conventionts

The final mark in in the range 1 – 100 (translated then into the related two digits value). For a complete list of the assessment criteria, check the teachers' manual.

Tools allowed

All additional aids stored locally on your laptop are allowed to use. Also web resources are allowed but plagiarism is **not** allowed. The code written by somebody else **must receive acknowledgment.**

Resits and repairs

The re-take is allowed in the following semester.

Grading

Student gets a mark on the examination in the range 1 – 10. The value is rounded up to half a point.

Teaching methods

The course lasts 7 weeks. Each week there are 2 + 2 contact hours with the teacher. Each topic is shortly introduced by the teacher and throughly explained preceding the practical hours.

For each topic a practical assignment is made available to practice, which helps students to practice and for which students can get feedback from the teacher. These practical assignment are not mandatory but they represent a good tutorial before start.

Resources

- Slides and practical assignments on the SharePoint.
- Book "Practical Unit Testing with JUnit and Mockito" by Tomasz Kaczanowski.
- Each practical includes a part of suggested reading and tutorials.

2.16. Information about QP Quality Principles

Content

Introduction

Topics that are discussed during the module

- Introduction Quality Management
- Perspectives of Quality Principles
- Software: CMMI, SPI,
- Production: Kaizen, Lean, Six Sigma
- Financial: IT Auditing, IFRS, BASEL II
- Compliancy: Sas-70, SOX, Laws, Pharma. Regulations
- Controls: Porter, Kaplan, Balanced Scorecard, Deming
-

Administration: ISO 9001:2000

-

Security: ISO 27001

-

Ethics: Codes of conduct, Declaration on oath, anti-bribary acts

-

Risk Management

Learning outcomes

-

Understand the importance of quality systems

-

Student is capable of applying quality models on real cases

-

Student has developed a critical attitude regarding quality systems and the achievableness of the implementation

-

Student works analytical and has the ability to advice management based on research

-

Student has developed skills in writing an essay

-

Student has developed a critical view environment and is able to judge impacts of measures and regulations

Examination and grading

Examination

- Groups: Assignments (Homework), Presentations and individual essay (WF: 0.7)
- Written exam (WF: 0,3)

Tools allowed

- Books
- Laptop
- Internet

Resits and repairs

Retake every semester of the written exam

Grading

-

Assessment of Tests, Assignments and Presentations

At Fontys ICT we want to stimulate that students are very active in their classes.

Group Assignments and Presentations and individual essay are graded with 70% of the final score if:

You are actively present in all classes, which means:

-

you arrive on time in class

-

during assignments and presentations, you are active on the topic at hand,

- during theory you have an active attitude,
- you have prepared well before class and do your homework.

You’re individual essay contains:

- 3 chosen topics applied to the company chosen
- In Euphorus <10% defects and plagiarism
- Has your critical view on the topics
- Contains a strong stakeholder analysis and quadrant
- Contains a worked out Porter Value Chain and balanced scorecard applied to your company with critical underpinning
- Comply with DOT framework research model
- APA References used
- Your point of view as CEO of the company with “out of the box” solutions.

Teaching methods

7 classes of 4 hours of which one class a Guest Lecture about Lean Six Sigma / Kaizen

Resources

Resources on Sharepoint published

2.17. Information about DWH Data warehousing

Content

- Understanding Data Warehousing: the new paradigm specifically intended to provide vital strategic information for the business managers and analysts.
- Understanding/investigating the radical changes for the information technology departments.
- Understanding impact of data warehousing on IT professionals and business users.
- Study topics: planning, requirements, architecture, infrastructure, design, data preparation, information delivery, deployment, and maintenance of a data warehouse.
- Big Data / Data analysis guest lecture
- Practical test implementation of DWH with Oracle and ETL tools

Learning outcomes

- Student is able to apply theory to practical cases
- Student can model the right architecture based on certain criteria
- Student has knowledge of required infrastructure
- Student understands the business impact of DWH's
- Student can advice companies for an apropriate architecture

Examination and grading

Examination

•Presentations + cases 40% (mark >=5)

•Exam 60% (chapters 1-13, 15 and 17 book DWH Fundamentals) (mark >=5)

•Total mark >=5.5 to pass!

Tools allowed

•book ‘Data Warehousing Fundamentals’ by Paulraj Ponniah

•printout sheets lectures DWH

•hand written notes

•Laptop + internet

•No mobile phones! No Facebook , messenger etc.

Resits and repairs

Retake every semester

Grading

Review of assignments

Review and feedback of presentations

Review and feedback written exam

Teaching methods

7 weekly classes of 4 hours of which 1 guest lecture "Big Data and BI Analysis / Machine Learning

Resources

•lecture sheets (partially based on book)

•advise:

book ‘Data Warehousing Fundamentals’ by Paulraj Ponniah, second edition isbn 978-0-470-46207-2

2.18. Information about ALE1 Automata and Logic for S 1

Content

This course is about the handling of logical propositions: read a proposition (in ASCII), make an internal tree representation, calculate the truth table, convert into the disjuctive normal form

Learning outcomes

Learning outcomes of this course are:

- Handling of logic propositions
- UML design
- algorithms & datastructures
- testing

Examination and grading

Examination

During the lessons you will get assignments for which you will get formative feedback (to which extent did you achieve the learning goals) and feed-forward (constructive guidance on how to improve) from the teacher.

Tools allowed

All additional aids are allowed.

Resits and repairs

Re-take is possible in the next semester.

Grading

To pass this course (grade 6), all assignments are implemented and work properly with an easy-to-use GUI (even on another machine (in particular: the lecturer's)).

For higher grades: incorporate the following aspects:

- good software design (classes, interfaces, SOLID principles, Design Patterns, …)
- clear documentation of your actual design and your design decisions
- proof of the robustness of your code (thorough test cases, code analysis, code coverage)
- robust recovery for incorrect user input
- other smart inventions and spectacular new features

Teaching methods

The course lasts 7 weeks. Each week there are 2 contact hours with the teacher. Each topic is shortly introduced by the teacher. For each topic a practical assignment is available, which helps students to practice and for which they can get feedback from the teacher.

Resources

- Slides and practical assignments on the SharePoint.
- common programming langauges like C# and Java

2.19. Information about ALE2 Automata and Logic for S 2

Content

This course is about the handling of state machines: read a finite state machine (in ASCII), make an internal representation, determine if strings belong to its language, convert it into a non-deterministic automaton, read regular expressions and read push down automata.

Learning outcomes

Learning outcomes of this course are:

- Handling of Finite State Machines
- Push Down Automata
- UML design
- algorithms & datastructures
- testing

Examination and grading

Examination

During the lessons you will get assignments for which you will get formative feedback (to which extent did you achieve the learning goals) and feed-forward (constructive guidance on how to improve) from the teacher.

Tools allowed

All additional aids are allowed.

Resits and repairs

Re-take is possible in the next semester.

Grading

To pass this course (grade 6), all assignments are implemented and work properly with an easy-to-use GUI (even on another machine (in particular: the lecturer's)).

For higher grades: incorporate the following aspects:

- good software design (classes, interfaces, SOLID principles, Design Patterns, …)
- clear documentation of your actual design and your design decisions
- proof of the robustness of your code (thorough test cases, code analysis, code coverage)
- robust recovery for incorrect user input
- other smart inventions and spectacular new features

Teaching methods

The course lasts 7 weeks. Each week there are 2 contact hours with teh teacher. Each topic is shortly introduced by the teacher. For each topic a practical assignment is available, which helps students to practice and for which they can get feedback from the teacher.

Resources

- slides and lab manual available on Sharepoint
- all online resources for common languages like C# and Java

2.20. Information about SD3

Content

Application of SD1, 2 and 3 in a functional design of information systems

Learning outcomes

- Student can apply theory into a functional design
- Student is able to use elicitation techniques to gather data and model UML
-

Examination and grading

Examination

- Written exam (60%)
- Theoretical and practical assignments and presentations (40%)

Tools allowed

None

Resits and repairs

Retake every semester

Grading

Review and feedback of presentations

feedback and review of written exam

Teaching methods

7 weekly classes of 4 hours

Resources

- **Book:** Object Oriented Systems Analysis and Design, Ashrafi & Ashrafi 1e 2009 ISBN: 978-1-29203-960-2

2.21. Information about SD4

Content

- The current collection of SOA books and articles is rich on high-level theory but light on practical advice. At the other end of the spectrum are the Web Services books that concentrate on APIs and programming, but gloss over the architecture.
- The Promise of SOA
- SOA — Architecture Fundamentals
- Business Architecture; BPM and SOA
- Service Context and Common Semantics
- Identify and Specify Services
- Design Service Interfaces and Service Implementations

Learning outcomes

- Student is able to understand the differences between services
- Student is able to model a process in BPM tool Bonitasoft
- Student understands the theory of a SOA architecture
- Student is able to advice a company based on infrastructure landscape with SOA components
- Students has knowledge of SOAP, REST and message brokers

Examination and grading

Examination

- Written exam (60%)
- Theoretical and practical assignments and presentations (40%)

Tools allowed

none

Resits and repairs

Retake every semester

Grading

Review of presentations and feedback

Solutions to homework cases

Teaching methods

7 classes of 4 hours

Resources

- **Book:** Object Oriented Systems Analysis and Design, Ashrafi & Ashrafi 1e 2009 ISBN: 978-1-29203-960-2
-

Web Services & SOA – Principles and Technology

o Michael P. Papazoglou: Web Services & SOA Chapters: Comprehensive case study, 1, 4, 5, 8, 15 and 16.1-16.9

- Lectures, powerpoints teacher

2.22. Information about CRY Crypography

Content

- whole number theory (to really understand RSA)
- symmetric key cryptography (for example DES or AES)
- public key cryptography (for example RSA)

Learning outcomes

- whole number theory (to really understand RSA)
- symmetric key cryptography (for example DES or AES)
- public key cryptography (for example RSA)

Examination and grading

Examination

2 practical assignments + written exam

Tools allowed

simple calculator

Resits and repairs

next semester

Grading

weighted average of practicals and written exam

Teaching methods

lectures + practical

Resources

slides + LabManual on the intranet

2.23. Information about ProEp Project E-phase

Content

Apply skills acquired during the whole study and apply them in one big project where a distributed system is created.

The main goals of this project are:

Have students use their inquisitive nature and critical thinking skills to define, execute and evaluate a justifiable project.

Prepare for the graduation project.

Students execute the project by developing a distributed application, in which the group is responsible both for performing software development and implementation of it on behalf of a client. Choices made need to be justified. Milestones and deadlines marking the progress of the project will be set in general terms.

Start on a high-level design (conceptual) and start implementing the biggest risks. Learn from previous iterations to speed up development.

Focus is on delivering a working system while keeping documentation in mind. Justifying choices to client, project manager, mentor and fellow proEP groups is key.

Learning outcomes

After successful completion the student is:

Able to perform a top down domain analysis of a distributed system which is fairly complex.

Able to make a justified choice for platforms and technologies necessary to be able to implement a system from point 1.

Implement a distributed application based on points above.

Able to work in a group with extensive responsibilities.

Entry requirements

Successful completion of:

Year 3 of the software engineering studies.

Internship.

Examination and grading

Examination

The final mark will consist of the group mark (50%) and the individual mark (50%).

The group mark comprises:

50% à products of the project; this is the straight average of the marks for:

- Project Plan
- Requirements Document
- Test Plan
- Design Document
- Software, User Manual, Technical Manual

The application of WCF (was it implemented correctly and in a logical way)

50% à project skills, teamwork and internal communication for the group as a whole.

The individual mark is derived from the group mark, using:

- the individual assessments of the tutor,

- the results of the last peer assessment.

The average of all individual marks will be the same as the group mark.

The assessment is based on both individual and group assessment.

Tools allowed

online information

sharepoint documentation.

Resits and repairs

Resit is possible in the next semester.

Grading

The final mark will consist of the group mark (50%) and the individual mark (50%).

The group mark comprises:

50% à products of the project; this is the straight average of the marks for:

- Project Plan
- Requirements Document
- Test Plan
- Design Document
- Software, User Manual, Technical Manual

The application of WCF (was it implemented correctly and in a logical way)

50% à project skills, teamwork and internal communication for the group as a whole.

The individual mark is derived from the group mark, using:

- the individual assessments of the tutor,
- the results of the last peer assessment.

The average of all individual marks will be the same as the group mark.

Teaching methods

project

Resources

Reader on Canvas, internet, forums, etc.

2.24. Information about TH Trends & Hypes

Content

write a report about a self chosen subject.

The structure of the template report has to be used.

Steps that have to be taken:

1. Subject, main research-question and end-product
2. subquestions, activitities (+strategies), phasing of the project
3. report structure
4. concept report.
5. final report

prerequisit: Internship has to be finished with a sufficient grade!

Learning outcomes

Learn :

- To do research about a self chosen ICT subject.
- to use the DOT researchframework for this research.
- to write report about it.

This must be done individually.

Examination and grading

Examination

The end mark is the mark for the final report (+ research product).

For the content the following aspects are important:

- Structure
- Subject description in chapter 2 of the report.
- Clarity of reasoning
- Use of sources, quality of the information
- Originality of your topic
- Use of English
- plagiarism

For a good mark and for the quality of your English it is important that you use your own words, and not start with a text from internet and change a number of words. Plagiarism is considered as fraud. Also know: previously awarded work cannot be reused.

Tools allowed

no end exam

Resits and repairs

insufficient means:

- rewrite the report the next semester.

Sometimes a new subject has to be choosen.

Grading

Grading for the wk1-, wk2-, wk3- and wk5-assignments are G (good), V (sufficient), or O (insufficient).

The end mark is the mark for the final report (+ research product).

Teaching methods

3 lectures.

individual assignments:

- handing in a subjectdescription (concept and final.
- handing in the structure of the report (+ introduction chapters)
- handing in the report (concept and final)

The teacher will give feedback on the assignments

Resources

powerpoint presentations

template report

Dot research documentation

websites etc.

2.25. Information about PRC2 Programming in C++

Content

- The C++ programming language, with focus on:
  - Parameter mechanism
  - Constructors (including copy-constructors),
  - dynamic memory allocation, (use heap <-> stack)
  - operator overloading
  - inheritance, multiple inheritance
  - virtual functions, abstract classes
- Using C++ with Arduino

Learning outcomes

- To be able to handle pointers and references.
- To understand the difference between the stack and the heap as memory regions.
- To be able to explain in which memory region -stack or heap-, declared variables and created objects are placed.
- To explain what memory leaks are and to be able to avoid them.
- To explain in which situations a destructor must be built and to be able to implement it correctly (that is, avoiding memory leaks).
- To be able to apply polymorphism using the “virtual” keyword correctly.
- To be able to explain and to apply the different purposes of the keyword “const”.
- To be able to use input/output streams to build simple text-based user interfaces.
- To be able to explain the difference between shallow and deep copying of objects, and to build appropriate implementations of copy constructors and assignment operators.
- To be able to create dynamic data structures and tear them down appropriately (that is, avoiding memory leaks).
- To apply inheritance and multiple inheritance properly.
- To be able to build abstract methods and pure abstract classes (that is, interfaces).
- To be able to explain what recursion is.
- To be able to analyse and to improve the execution speed of a program.

Examination and grading

Examination

practical assessment

Tools allowed

no additional tools are allowed

Resits and repairs

one resit in the same block, otherwise : next semester

Grading

practical assessment

Teaching methods

lectures with theory and practical

Resources

books, tutorials, slides, exercises, practical assignments

2.26. Information about PRC1 Programming in C

Content

- The C programming language, with focus on:
  - pointers,
  - arrays,
  - data structures,
  - strings,
  - bit manipulations,
  - file handling
  - call-by-value parameter mechanism
  - usage of pointers in fucntions
- Unit-testing

Learning outcomes

unit tests To improve the quality of your code, at the end of this course you will be able to apply unit tests and you will be able to review if the tests have a good coverage. Note: in your previous C# courses you have worked with the Microsoft unit test framework. In this course you will work with the Unity framework. **pointers** In this course you will learn the theory of pointers and how you can apply them. This is related to the items Reference types vs value types in C#. **arrays** In this course you will learn how you can use C-arrays in your program; in relation with pointers. **structs** You will learn what structs are and how you can apply them in a program. **file handling** In this course you will learn how to write and read from files in C. **strings**

In this course you will learn how to work with C-strings.

bit manipulation

In this course your will learn the various bit manipulation operators.

You will learn when and how to apply them in your program.

Examination and grading

Examination

practical assessment

Tools allowed

your practical assignments; no additional tools are allowed

Resits and repairs

one resit in the same block, otherwise : next semester

Grading

practical assessment

Teaching methods

lectures with theory and practical

Resources

slides, video's, exercises, tutorials

2.27. Information about Graduation Project

Content

During the last semester of the bachelor course Information & Communication Technology the student must show he can function at the level of a graduate by completing a graduation project. This project comprises 90 - 100 working days and is normally carried out in the business community.

In this brochure you will be informed about the preparation, the realization and the evaluation of the graduation project period

There are only 5 possible starting dates per year for your graduation: Four at the first or second week of every quarter, and a fifth possibility in week 5 of the spring semester (feb-july). Below, all start dates are indicated by A,B,C,D and E. Accompanying graduation proceedings dates are indicated by A, B, C, D and E. In some cases the proceedings can also take place 1 week sooner.

Failure to start or finish a graduation on the dates below will automatically mean the start or finish will be postponed to the next scheduled possibility. To be able to start in a quarter, the student needs to have an approved survey on Wednesday of week 8 of the previous quarter. (for instance: for starting

in September, you will need to have an approved survey before Wednesday in week 8 of the April-July quarter)

Learning outcomes

- Student is able to apply all teached knowledge during the graduation project
- Student is capable of applying the DOT framework research model
- Student can critical assess the environment of the company and set frequirements and scope by interviewing business people
- Student has the capability to advice the company with recommendations
- Student is capable of working by him / her self
- Student takes an entrepeneural attitude
- Student is able to adapt to the business and codes of conduct and regulations in the company
- Student can finish his / her product / project within 90-100 days
- Student is able to present the results in a process way with enough underpinning of choices before a jury

Examination and grading

Examination

Graduation project > 5.5

Presentation before jury > 5.5

Process Report > 5.5

Tools allowed

Not applicable

Resits and repairs

Student can, after approval of the FHICT Examboard, repair either the presentation or the report but not the work. All parts must be 5.5 or higher. In case of repair a maximum mark of 6 is awarded.

Grading

Student is assessed at the company by the university tutor and the company tutor for the work contents and attitude at the company

Student is assessed and questioned during his / her defence presentation before the jury

Student is assessed on his / her process report

Teaching methods

University tutor visits the company and the student at least two times. One time between week 4-6 and one time to rehearse the final presentation and discuss the mark for the work at the company

Resources

all learned at Fontys ICT

3. Information about Specialisation ICT & Technology

3.1. Information about Internship

Content

During the four year bachelor course Information & Communication Technology you will work as a trainee in a company (profit or non-profit).

This internship comprises 90-100 working days (planned in the second semester of the third year). Take enough time to prepare yourself!

In this brochure you will be informed about the preparation, the realization and the evaluation of the internship project period.

Learning outcomes

- Student is able to apply all teached knowledge during the graduation project
- Student is capable of applying the DOT framework research model
- Student can critical assess the environment of the company and set frequirements and scope by interviewing business people
- Student has the capability to advice the company with recommendations
- Student is capable of working by him / her self
- Student takes an entrepeneural attitude
- Student is able to adapt to the business and codes of conduct and regulations in the company

Student can finish his / her product / project within 90-100 days

Examination and grading

Examination

internship project > 5.5 (40%)

Presentation before university tutor and company tutor > 5.5 (20%)

Process Report > 5.5 (40%)

Tools allowed

Not applicable

Resits and repairs

Student can, after approval of the FHICT Examboard, repair either the presentation or the report but not the work. All parts must be 5.5 or higher. In case of repair a maximum mark of 6 is awarded.

Grading

Student is assessed at the company by the university tutor and the company tutor for the work contents and attitude at the company

Student is assessed and questioned during his / her presentation before the university tutor and the company tutor

Student is assessed on his / her process report

Teaching methods

University tutor visits the company and the student at least two times. One time between week 4-6 and one time to rehearse the final presentation and discuss the marks

Resources

all learned at Fontys ICT

3.2. Information about PTT6 Embedded systems project

Content

The Prof Assignment is a research project on which you will work throughout the semester. In the Prof Assignment, you will apply the knowledge and skills you have acquired in the various courses, and you will have to actively search for new knowledge that you might need in order to finish your Prof Assignment. In addition, you will work on your professional development. You will receive regular feedback on both your professional development and behavior as well.

The Prof Assignment takes place in the context of the Fontys ICT InnovationLab, in which companies and the FHICT Lectorates collaborate to find innovative solutions to known and new problems by working on research assignments. The project for the Prof Assignment is based on one of these research assignments. The closing event of the Prof Assignment will be the "Innovation Insight" fair, at which all projects groups have to show their results.

The general objectives of the Prof Assignment are:

- Applying a research based approach to come up with better and substantiated solutions to a problem.
- Stimulate to learn new things, both within and outside the scope of the Prof Assignment and the courses.
- Practicing real-life assignments of a kind that you will also encounter as a professional in the work field.
- Creating a complete image of you as a student and a future professional (both with regard to knowledge, skills and professional behavior).

This semester will focus on the professional development of software for reactive embedded systems. You will be given the opportunity to prove that you are able to professionally work on an embedded systems project in a team. In the Prof Assignment, you will go through the entire developing cycle of a product.

Scrum will be used to manage the development process. This means that you will regularly receive feedback from the client and your teachers. This feedback may pertain to o the product, the process and your professional behaviour. You are expected to use the feedback to implement improvements.

Learning outcomes

Professionally developing a product for a client in a team. In which you will have to show that:

- You know how to apply research skills in order to gain new knowledge necessary to realize the project and to justify choices that play a role in the design and realization of Prof Assignment products. And you show that you can use the research framework to come up with better and substantiated solutions to a problem.
- Together with your Prof Assignment group, you are able to develop a reactive embedded system that reacts to outside inputs. This input may come from sensors and other devices it can communicate with. You should incorporate subject matter knowledge from the courses (but not limited too) into the system.
- You are able to provide insight into the progress of the Prof Assignment and your own contribution to the Prof Assignment.
- You are able to reflect on feedback from the client, the tutor/semester coach, teachers and fellow students. In addition, you know how to use this feedback to improve your contribution to the Prof Assignment.
- You know how to apply Scrum to the Prof Assignment project.
- You can guarantee the quality of products by applying various testing, reviewing and design methods.
- You know how to use a version control system such as GIT or SVN to apply version management to code and documentation and the work on code and documentation in a team.

The abovementioned learning objectives will be used as input for the evaluation of the various assessment dimensions of the Prof Assignment, which are listed in paragraph 8.3.4. Because of its diverse character and the freedom you will get within the Prof Assignment project, it is also possible to add personal learning objectives in consultation with your Semester Coach.

Examination and grading

Examination

The Prof Assignment has periodic formative assessments that result in a formative indicator, which in turn will be part of the semester portfolio. The input for the formative assessment with regard to the Prof Assignment will come from the teachers of the various courses, the semester coach, fellow students and the external client

Informal:

- You can get feedback from your semester coach and course teachers at any time, either unsolicited or at your own request.

Formal:

- There will be peer reviews, in which students provide each other with feedback.
- There will also be audits, in which teachers will give feedback on products of the Prof Assignment.
- There will be progress interviews with your semester coach. The Personal Development Plan (PDP), and your reflection on the plan and its outcomes, will also be discussed during this interview.
- You will get feedback on your own functioning at regular interviews during the Scrum sprints.

The products that will be evaluated are: project plan, PDP, Scrum reports, audit reports, peer review reports, design documentation, research documentation, reflection reports, the actual product (or products) that you made for the client, the demonstration at the "Innovations Insight" fair at the end of the semester.

Tools allowed

If specific hardware, software or tools are needed when working on the research project, please consult with the manager of the semester.

Resits and repairs

Students will have the entire semester to build a portfolio and they will receive regular feedback on the products they hand in. Students may also ask for feedback. This way students will get the chance to repair aspects of the Prof Assignment that they do not master yet throughout the course of the Prof Assignment project. Because of this, the Prof Assignment as a whole cannot be retaken.

Grading

At the end of the semester, students receive a formative indicator for their Prof Assignment, which they can incorporate into their semester portfolio. Because both the course subject matter and the students' professional development are part of the learning objectives, the student will be evaluated with regard to both aspects. In principle, the students of a project group will receive a collective formative grade with regard to the subject matter; however, this formative grade may deviate individually based on audits, peer reviews and professional conduct etc.

The assessment of the Prof Assignment will be based on the following assessment dimensions:

- Application of knowledge and insight
- Professional Development

- Learning skills
- Communication
- Judgement

A formative grade will be given for each assessment dimension, using the USGO grading scheme. The formative grade of each dimension will be formed using a number of criteria. In the portfolio (paragraph: PDP) students will indicate for the various criteria how they intend to prove having mastered the criteria in question using performance indicators. At the end of the semester, the student will look back (reflection) and indicate how the criteria in question has been met.

The assessment dimension *Application of knowledge and insight* will weigh as half of the Formative indicator. The other three assessment dimensions will fall under the header *Professional Development* and together they will constitute the other half of the Formative indicator.

Teaching methods

The learning will take place by means of a research project. Both the group and the individual student will get regular feedback from the semester coach, both in his role as the tutor of the Prof Assignment group and as the personal academic advisor who guides the individual student.

Resources

- The Prof Assignment manual
- The Scrum manual

3.3. Information about MDD6 Model driven development

Content

The software architecture of modern high-tech embedded systems generally is highly complex. Designing such complex systems usually requires a great bit of abstraction. The student therefore will have to learn how to design systems using software building blocks (interacting components).

When it comes to developing complex Embedded Systems, it is very important to detect any possible problems in an early stage. If not, the consequences of possible mistakes or incomplete specifications, which are inevitable, due to the complexity, will present themselves much later in the project. Solving these problems at that stage is a tiresome and expensive business.

Moreover, it is important to improve the productivity of embedded software engineers. The market is ever more demanding of embedded software. Manually writing and debugging software is a very labor-intensive process. The trick is not to work harder, but to work smarter.

Therefore, in the embedded software business demand arose for software engineers who know how to work with a Model-Driven Development approach. This approach puts the focus on a model of the software rather than the source code or the documentation. The code (and even documentation) will be generated from the model.

In the course the student will be acquainted with this Model-Driven Development (MDD) approach and learn how to design software using domain-specific modelling language.

Learning outcomes

The student will learn how to make embedded software, not by programming, but by modelling. You will learn to focus on the model of the software and to see the code as an artefact that you may generate from your model. You will learn to work with a software tool that supports this Model-Driven Development approach.

After having followed this course, you are able to:

- use any given modelling language and accompanying set of tools to make a model of an embedded system application, taking any given requirements as a starting point.
- validate the model and if possible verify it, insofar the modelling tool allows this,
- interface the model with a given embedded system platform and link it with existing software through hand-written code.
- generate and build code from the model and implement it on the particular platform.

Examination and grading

Examination

Assessment will be based on a series of assignments in which the student can prove having met the various learning objectives. The student will receive formative feedback for every assignment handed in in time. Every assignment the student hands in will be formatively evaluated using the USGO grading scheme.

Students may work together in couples to complete their assignments, but the formative assessment will be individual.

Tools allowed

The student will have access to a professional software-modelling tool and an embedded Linux system on which the software generated from the model should run. Students can also propose their own hardware platform. If they wish to do so, they need the permission from a teacher.

Resits and repairs

Throughout the semester the students will receive formative feedback on the assignments handed in, allowing them to continuously improve themselves.

There is a single repair opportunity for each assignment. A repair assignment will be graded with an S at best.

Grading

At the end of the semester, each student will receive a formative indication based on the evaluations for the assignments and the way in which the student has processed the feedback. Each assignment has its own weight in the formative indication.

Teaching methods

The classes will consist of a theoretic introduction and/or instruction by the teacher and a practical assignment in which the students will work on their modelling assignments.

The teacher will introduce the student to the concepts of Model Driven Development, the modelling language and the use of the modelling tool. The students will study the various sources of information they are given and practice modelling by carrying out a number of modelling assignments that grow increasingly in complexity:

In the first assignments, you will get familiar with the modelling tool and you will get the chance to train your design skills using abstract concepts. Subsequently you will learn how to generate code for an actual embedded system platform from an abstract model. Finally, you will do a final assignment to show that you are able to model and build a reasonably complex embedded application.

Teacher Independent learning is part of the teaching method. You will have to use methods of the research framework to gain knowledge and apply it when solving problems of the assignments.

Resources

The student will have access to the following learning materials:

- Digital learning materials (PowerPoint slides, assignment descriptions, project templates).

- A professional modelling tool.
- An embedded system.

Students moreover may refer to the following (non-obligatory) literature:

- A Practical Guide to SysML: The Systems Modelling Language, Authors: Sanford Friedenthal, Alan Moore, Rick Steiner, ISBN-10: 0123743796
- Systems Engineering with SysML/UML: Modelling, Analysis, Design, Author: Tim Weilkiens, ISBN-10: 0123742749

3.4. Information about ES6 Embedded systems 6

Content

In previous semesters you became familiar with designing software and programming in Linux user space. In the course ES6, you will get acquainted with the Linux kernel.

Roughly half of this course is writing device drivers (kernel modules) yourself and using different interfaces between kernel-space and user-space. Within the Linux kernel, you will use the C programming language.

The other approximate half of this course will focus on system development. This means:

- design on system level
- designing interfaces between hardware, kernel software and user space software
- implementing and testing your complete system

Learning outcomes

Upon completing this course, you will be able to:

- Develop Linux device drivers, which encompasses among others:
  - Using different interfaces between user space and kernel space.
  - Debugging your kernel module.
  - Understanding the difference between physical and virtual memory.
  - Writing re-entrant code.
  - Using interrupts.
- Write tidy, correct, expressive and well tested code.
- Measure correctness and speed of the implementation and select the right tools to do this (e.g. an oscilloscope or a logic analyzer).
- Find out how stuff works and critically analyze your sources (e.g. data sheets) while being able to clearly document the results of your research.
- Develop a solution for a small embedded product.
- Convince your stakeholders that your solution works well by documenting your (system) design and by showing your test results.

Examination and grading

Examination

Every 2 to 4 weeks the students will get a new practical assignment. For these assignments, you will do research the hardware/interface in question and you will design, implement, test and document your solution. You will hand in your work in Canvas. You will have to demonstrate some of the assignments live during the practical sessions.

The teacher will evaluate the assignment and provide the students with feedback, which they must use to improve their skills. When evaluating the learning process, the teacher will take into account the extent to which feedback from the previous assignments was processed. The formative assessment of the assignment will be graded using the USGO grading scheme:

- G or O: If you continue this way, the formative indicator for the course in question will be Good or Outstanding.
- S: If you continue this way, the formative indicator for the course in question will be Satisfactory.
- U: If you continue this way, the formative indicator for the course in question will be Unsatisfactory.

Tools allowed

- An ES6 kit (ISSD)
- A Laptop (OSX / Windows / Linux) with the necessary compiling environment for the embedded board. There is a virtual Linux environment available from your teacher that contains everything you need to get started.
- Various measuring devices (ISSD)

Resits and repairs

During this course the student will get formative feedback. The student is supposed to improve his work based on the given feedback. Because assignments build upon eachother, students have until the end of the course to show improvements.

Grading

The formative indicator for the course will be determined based on a combination of the learning objectives that the student attained. Please note that the formative indicator is **not** calculated by averaging the results of the assignments. Students can positively influence their evaluation through:

- Quality (not quantity) of the research report
- Broader research than strictly necessary for the assignment
- Test quality
    - proper test cases
    - proper definition of the expected result
    - proper description of the actual result
    - valid conclusion
- Code quality:
    - clean code
    - well-structured code
    - code is to-the-point
    - avoiding code duplication
    - proper use of constants and defines (no magic numbers in the code)
    - as few comments as possible (code should be self-explanatory and should not have to rely on any comments)

Teaching methods

- Frontal (lectures, mostly 1 short lecture per assignment)
- Practical session with student-specific feedback
- Independent learning

Resources

- Sheets
- Documentation on various web sites
- Assignment documents
- Data sheets of the embedded board

3.5. Information about SD6 Professional system development

Content

During the SD6 course, you will get familiar with a number of techniques that are necessary to successfully develop software in a team. The techniques discussed are directly applicable in the Prof Assignment.

Learning outcomes

- You are able to describe the Scrum process in your own words and you are able to explain how this process is supporting the process of dealing with changes within a project aimed at creating value for the client.
- You are able to describe the role of Configuration Management and its subcomponents Change Management, Version Management and Release Management in managing changes within an Embedded Software project.
- You are able to set up procedures for the correct use of 'source control' and 'continuous integration' in a small-scale project, such as the Prof Assignment. In addition, you know how to apply these procedures.
- You are able to describe and use the various testing strategies.
- You are able to describe what a Design Pattern is and you can explain its purpose.
- You are able to characterize and implement a number of specific Design Patterns.
- You are able to elaborate on the strengths and weaknesses of a number of specific Design Patterns.
- You are able to implement an application in which you demonstrate the strength of a number of specific Design Patterns.

Examination and grading

Examination

The course will be assessed through assignments. These assignments will be made either individually or in couples of two students and they will be evaluated individually (with the exception of the assignments for the Prof Assignment groups). The couples will be announced at the start of the assignment or formed in agreement with the teacher.

The assignments will lead to products. These products will be rated with a formative indicator using the USGO grading scheme. The students will also receive feedback on the assignments. When evaluating the assignments the teacher will take into account the extent to which feedback was processed into the assignment.

The products to be evaluated are:

- A personal summary of the Scrum process, in which the roles, the activities, the products and objectives of Scrum are described.
- A presentation in which Configuration Management and its subcomponents Change Management, Version Management and Release management are explained and in which its relevance for problems to be solved in the Prof Assignment is explained.
- A fully installed and functional version management system that supports continuous integration and continuous testing, together with a process description for the user. This system and its procedures have to be applicable to a small-scale project, such as the Prof Assignment.
- A test plan in which the various testing strategies for the testing of an embedded system and its software are described. This testing plan has to be applied to a small-scale project, such as the Prof Assignment.

- The teacher will define the assignments for Design Patterns, but as the semester progresses students will increasingly create their own assignments. Assignments that students define themselves will have to be approved by the teacher.

Tools allowed

A PC with:

- A version management system of the student's choice.
- A continuous integration and testing environment of the student's choice.

Resits and repairs

Throughout the semester students will receive formative feedback on the assignments handed in, allowing them to continuously improve themselves.

There is a single repair opportunity for each assignment. To make use of a repair opportunity, students have to consult their teacher within a day after the assignment is graded, so that a repair plan can be made. A repair assignment will be graded with an (S) at best.

Grading

At the end of the semester each student will receive a formative indicator based on the evaluations of the assignments and how the student has processed the feedback.

Teaching methods

- Scrum workshop
- Lecture
- Instruction with feedback
- Independent learning

Resources

- Internet sources.

3.6. Information about Graduation Project

Content

During the last semester of the bachelor course Information & Communication Technology the student must show he can function at the level of a graduate by completing a graduation project. This project comprises 90 - 100 working days and is normally carried out in the business community.

In this brochure you will be informed about the preparation, the realization and the evaluation of the graduation project period

There are only 5 possible starting dates per year for your graduation: Four at the first or second week of every quarter, and a fifth possibility in week 5 of the spring semester (feb-july). Below, all start dates are indicated by A,B,C,D and E. Accompanying graduation proceedings dates are indicated by A, B, C, D and E. In some cases the proceedings can also take place 1 week sooner.

Failure to start or finish a graduation on the dates below will automatically mean the start or finish will be postponed to the next scheduled possibility. To be able to start in a quarter, the student needs to have an approved survey on Wednesday of week 8 of the previous quarter. (for instance: for starting

in September, you will need to have an approved survey before Wednesday in week 8 of the April-July quarter)

Learning outcomes

- Student is able to apply all teached knowledge during the graduation project
- Student is capable of applying the DOT framework research model
- Student can critical assess the environment of the company and set frequirements and scope by interviewing business people
- Student has the capability to advice the company with recommendations
- Student is capable of working by him / her self
- Student takes an entrepeneural attitude
- Student is able to adapt to the business and codes of conduct and regulations in the company
- Student can finish his / her product / project within 90-100 days
- Student is able to present the results in a process way with enough underpinning of choices before a jury

Examination and grading

Examination

Graduation project > 5.5

Presentation before jury > 5.5

Process Report > 5.5

Tools allowed

Not applicable

Resits and repairs

Student can, after approval of the FHICT Examboard, repair either the presentation or the report but not the work. All parts must be 5.5 or higher. In case of repair a maximum mark of 6 is awarded.

Grading

Student is assessed at the company by the university tutor and the company tutor for the work contents and attitude at the company

Student is assessed and questioned during his / her defence presentation before the jury

Student is assessed on his / her process report

Teaching methods

University tutor visits the company and the student at least two times. One time between week 4-6 and one time to rehearse the final presentation and discuss the mark for the work at the company

Resources

all learned at Fontys ICT